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EXAMINER

PATTERSON, MARC A

ART UNIT PAPER NUMBER

1772

DATE MAILED: 12/03/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/540,028

Applicant(s)

REIF ET AL.

Examiner

Marc A Patterson

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 August 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 20-60, 65 and 66 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 20-60, 65 and 66 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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DETAILED ACTION

WITHDRAWN REJECTIONS

1. The 35 U.S.C 112 second paragraph rejection of Claim 20, of record on page 2 of the previous Action, is withdrawn.

NEW REJECTIONS

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 20 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The phrase 'changes uniformly or in a stepwise manner' is indefinite as it is unclear where the change occurs. For purposes of examination, it will be assumed that the coefficient of thermal expansion of the insert and coupling layer is not the same.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 20 – 21, 25 – 26, 29, 34 – 39, 49, 52 – 57 and 65 – 66 are rejected under 35 U.S.C. 102(b) as being anticipated by Blakeley et al (U.S. Patent No. 5,118,257).

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With regard to Claims 20 – 21, 25 – 26, 29, 34 – 39 and 49, Blakeley et al disclose a plastic structural element (layer of a turbine blade; column 2, lines 30 – 45) comprising a plastic material (carbon – fiber reinforced epoxy; column 4, lines 59 – 68; column 5, lines 1 – 21) and an insert having a length embedded in the plastic material and a length that projects from the plastic material (column 4, lines 59 – 68; column 5, lines 1 – 21; Figure 1); the insert exhibits a different elastic modulus from the plastic material (the insert is an aluminum alloy, and the plastic material has a sufficiently low modulus to flow; column 3, lines 44 – 51; column 4, lines 59 – 68; column 5, lines 1 – 21; column 6, lines 8 – 21) and a plastic coupling layer is arranged to join the insert to the plastic material (intermediate fiber – reinforced layer of turbine blade; column 5, lines 1 – 21); the insert is a connection for connecting attachment means (a root attachment; column 4, lines 59 – 67); the plastic structural element and insert are thermally compatible, such that high stresses do not result from curing (column 3, lines 11 – 14); the coupling layer therefore has a volume fraction of fibers whereby the coefficient of thermal expansion between the plastic material and the insert are equilibrated so that differences in the coefficient of thermal expansion at the interface between the plastic material and insert is minimized. However, the claimed aspect of the coupling layer having ‘a volume fraction of fibers whereby the coefficient of thermal expansion between the plastic material and the insert are equilibrated so that differences in the coefficient of thermal expansion at the interface between the plastic material and insert is minimized’ is given little patentable weight, as the phrase defines a desired result of the invention, rather than a structural limitation.

With regard to Claims 52 – 57 and 65, the embedded length has finger – like projections (undulations; the embedded length therefore has an enlarged surface area, formed by openings,

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which are hook – shaped anchoring elements or bends; column 5, lines 11 – 21); the fibers are therefore laminated into the plastic so as to anchor the insert, and are joined to the insert by a loop connection.

With regard to Claim 66, the claimed aspect of the embedded length of the insert being finger – shaped ‘so as to reduce a geometrical moment of inertia of the embedded length’ is given little patentable weight, as the phrase defines a desired result of the invention, rather than a structural limitation.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 22, 28, 30 – 33 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Blakeley et al (U.S. Patent No. 5,118,257).

Blakeley et al disclose a plastic structural element comprising a fiber – reinforced plastic as discussed above. Blakeley et al fail to disclose a plastic having a fiber content of 45 – 60 volume percent. However, Blakeley et al disclose a plastic having a fiber content of at least 1% (the layer comprises fiber; column 5, lines 1 – 21). Therefore, the volume fraction of fiber would be readily determined through routine optimization by one having ordinary skill in the art depending on the desired end use of the product. It therefore would be obvious for one of ordinary skill in the art to vary the volume fraction of fiber, since the volume fraction of fiber

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would be readily determined through routine optimization by one having ordinary skill in the art depending on the desired end result as shown by Blakeley et al. *In re Boesch and Slaney*, 205 USPQ 215 (CCPA 1980).

8. Claims 23 – 24, 27, 42 – 44, 46 – 48 and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Blakeley et al (U.S. Patent No. 5,118,257) in view of Reese Jr. (U.S. Patent No. 5,667,866).

Blakeley et al disclose a plastic structural element comprising a layered structure comprising carbon fiber as discussed above. With regard to Claims 23 – 24, 27, 42 – 44, 46 – 48 and 60, Blakeley et al fail to disclose a plastic structural element comprising glass fiber, and a plastic structural element comprising glass fiber and carbon fiber and a plastic structural element in which the fibers in individual layers of the structure are oriented in at least one direction, the fiber layers next to the plastic material being aligned 30 to 70 degrees relative to each other.

Reese Jr teaches that glass fiber and carbon fiber are equivalent as reinforcement for a structural element, for the purpose of forming a structural element having improved load carrying properties (column 2, lines 15 – 21). The desirability of providing for glass fiber and carbon fiber in Blakeley et al, which is a structural element, would therefore be obvious to one of ordinary skill in the art in view of Reese Jr.

Reese Jr. also teaches the orientation of fiber layers relative to each other in a layered composite (column 2, lines 22 – 38) for the purpose of forming a structural element having improved load carrying properties (column 2, lines 15 – 21). The desirability of providing for a

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layered composite in Blakeley et al, which is a structural element, would therefore be obvious to one of ordinary skill in the art in view of Reese Jr.

It therefore would have been obvious for one of ordinary skill in the art at the time Applicant's invention was made to have provided for glass fiber in Blakeley et al in order to form a structural element having improved load carrying properties as taught by Reese Jr and to have provided for oriented fiber layers in Blakeley et al in order to form a structural element having improved load carrying properties as taught by Reese Jr.

With regard to Claims 42 – 44, Reese Jr. fails to disclose a coupling layer wherein the outer and inner layers of the coupling layer are aligned 30 to 70 degrees relative to each other. However, Reese Jr. discloses a coupling layer wherein the inner and outer layers of the coupling layer are oriented perpendicular (column 2, lines 22 – 38) depending on the desired end results. Therefore, it would have been obvious for one of ordinary skill in the art to vary the orientation of the inner and outer layers, since the orientation of the layers would be readily determined through routine experimentation by one having ordinary skill in the art depending on the desired end result. *In re Boesch and Slaney*, 205 USPQ 215 (CCPA 1980).

With regard to Claim 59, Reese Jr. teaches that carbon fibers and aramid fibers are equivalent in the making of a structural element (column 2, lines 5 – 10); the claimed aspect of the fibers being 'aramide' fibers therefore reads on Reese Jr.

With regard to Claim 60, Reese Jr fails to disclose an insert with end parts that are tapered at an acute angle which is the inverse tangent of 1:30 to 1:10. However, Reese Jr. discloses a honeycomb structure comprising joined hexagons, each having six sides with 120 degrees between them (column 2, lines 5 – 21; Figure 1) an insert therefore has with end parts

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that are tapered at an obtuse angle, 120 degrees, which is the inverse tangent of 1:30 to 1:10.

Reese also teaches that core configurations comprising a taper other than 120 degrees are equivalent to the honeycomb configuration, depending on the desired end result (column 3, lines 3 – 12). It would therefore have been obvious for one of ordinary skill in the art to vary the taper of the end parts, since the taper of the end parts would be readily determined through routine experimentation by one having ordinary skill in the art depending on the desired end result. *In re Boesch and Slaney*, 205 USPQ 215 (CCPA 1980).

9. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Blakeley et al (U.S. Patent No. 5,118,257) in view of Reese Jr. (U.S. Patent No. 5,667,866) and further in view of Kawai (European Patent No. 0528131).

Blakeley et al and Reese Jr. disclose a plastic structural element comprising a glass fiber and carbon fiber – reinforced composite as discussed above. Blakeley et al and Reese Jr. fail to disclose a composite having a volume fraction of fibers in the coupling layer which decreases toward the insert starting from the plastic element, and the volume fraction of glass fiber decreases toward the insert in relation to the amount of carbon fibers.

Kawai teaches a fiber – reinforced plastic structural element (fiber – reinforced composite; page 3, lines 37 – 45) having a volume fraction of glass fibers which increases toward an insert starting from the structural element (the composite has a gradient composition; page 3, lines 46 – 52) for the purpose of obtaining a composite having excellent mechanical strength (page 2, lines 5 – 9). The desirability of providing for a volume fraction of glass fibers

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which increases in Blakeley et al and Reese Jr, which is a plastic structural element, would therefore be obvious to one of ordinary skill in the art.

It therefore would have been obvious for one of ordinary skill in the art at the time Applicant's invention was made to have provided for a volume fraction of glass or carbon fibers which increases in Blakeley et al and Reese Jr. in order to obtain a composite having excellent mechanical strength as taught by Kawai.

Kawai fails to disclose a plastic structural element wherein the volume fraction of fibers in the coupling layer decreases toward the insert starting from the plastic material. However, as stated above, Kawai discloses a plastic structural element wherein the volume fraction of fibers in the coupling layer increases toward the insert starting from the plastic material. It would have been obvious to one having ordinary skill in the art to arrange the layers to have a decreasing, instead of increasing, fiber content, since it has been held that a mere reversal of the essential working parts of a device involves only routine skill in the art. *In re Einstein*, 8 USPQ 167.

10. Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Blakeley et al (U.S. Patent No. 5,118,257) in view of Kawai (European Patent No. 0528131).

Blakeley et al and Reese Jr. disclose a plastic structural element comprising a glass fiber and carbon fiber – reinforced composite as discussed above. Blakeley et al and Reese Jr. fail to disclose a composite having a volume fraction of fibers in the coupling layer which decreases toward the insert starting from the plastic element, and the volume fraction of glass fiber decreases toward the insert in relation to the amount of carbon fibers.

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Kawai teaches a fiber – reinforced plastic structural element (fiber – reinforced composite; page 3, lines 37 – 45) having a volume fraction of glass fibers which increases toward an insert starting from the structural element (the composite has a gradient composition; page 3, lines 46 – 52) for the purpose of obtaining a composite having excellent mechanical strength (page 2, lines 5 – 9). The desirability of providing for a volume fraction of glass fibers which increases in Blakeley et al and Reese Jr, which is a plastic structural element, would therefore be obvious to one of ordinary skill in the art.

It therefore would have been obvious for one of ordinary skill in the art at the time Applicant's invention was made to have provided for a volume fraction of glass or carbon fibers which increases in Blakeley et al and Reese Jr. in order to obtain a composite having excellent mechanical strength as taught by Kawai.

Kawai fails to disclose a plastic structural element wherein the volume fraction of fibers in the coupling layer decreases toward the insert starting from the plastic material. However, as stated above, Kawai discloses a plastic structural element wherein the volume fraction of fibers in the coupling layer increases toward the insert starting from the plastic material. It would have been obvious to one having ordinary skill in the art to arrange the layers to have a decreasing, instead of increasing, fiber content, since it has been held that a mere reversal of the essential working parts of a device involves only routine skill in the art. *In re Einstein*, 8 USPQ 167.

11. Claims 50 – 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Blakeley et al (U.S. Patent No. 5,118,257) in view of Komai et al. (U.S. Patent No. 6,238,783).

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Blakeley et al discloses a plastic structural element comprising an insert as discussed above. With regard to Claims 50 – 51, Blakeley et al fails to disclose an insert which has an aluminum surface which is anodically oxidized and roughened at the portions receiving the coupling layer.

Komai et al teach that it is well known in the art to anodically treat and roughen an aluminum surface prior to bonding with a thermoplastic resin layer for the purpose of obtain good adhesion (column 1, lines 28 – 65). The desirability of providing for a surface which is anodically oxidized and roughened at the portions receiving the coupling layer in Blakeley et al, which is aluminum bonded with a plastic layer, would therefore be obvious to one of ordinary skill in the art

It therefore would have been obvious for one of ordinary skill in the art at the time Applicant's invention was made to have provided for anodically treating and roughening an aluminum surface prior to bonding with a thermoplastic resin layer in Blakeley et al in order to obtain good adhesion as taught by Komai et al.

ANSWERS TO APPLICANT'S ARGUMENTS

12. Applicant's arguments regarding the 35 U.S.C. 102(b) rejection of Claims 20 – 21, 25 – 26, 29, 34 – 39, 49, 52 – 57 and 65 as being anticipated by Blakeley et al (U.S. Patent No. 5,118,257), 35 U.S.C. 103(a) rejection of Claims 22, 28, 30 – 33 and 45 as being unpatentable over Blakeley et al (U.S. Patent No. 5,118,257), 35 U.S.C. 103(a) rejection of Claims 23 – 24, 27, 42 – 44, 46 – 48 and 60 as being unpatentable over Blakeley et al (U.S. Patent No. 5,118,257) in view of Reese Jr. (U.S. Patent No. 5,667,866), 35 U.S.C. 103(a) rejection of Claim

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40 as being unpatentable over Blakeley et al (U.S. Patent No. 5,118,257) in view of Reese Jr. (U.S. Patent No. 5,667,866) and further in view of Kawai (European Patent No. 0528131) as being unpatentable over Blakeley et al (U.S. Patent No. 5,118,257) in view of Reese Jr. (U.S. Patent No. 5,667,866) and further in view of Kawai (European Patent No. 0528131), 35 U.S.C. 103(a) rejection of Claim 41 as being unpatentable over Blakeley et al (U.S. Patent No. 5,118,257) in view of Kawai (European Patent No. 0528131) and 35 U.S.C. 103(a) rejection of Claims 50 – 51 as being unpatentable over Blakeley et al (U.S. Patent No. 5,118,257) in view of Komai et al. (U.S. Patent No. 6,238,783), of record in the previous Action, have been carefully considered but have been found to be persuasive for the reasons set forth below.

Applicant argues, on page 11 of Paper No. 11, that it should not be assumed that the elastic modulus is different for the plastic and insert, and the coefficient of thermal expansion is the same. However, as stated above, the plastic material and insert are thermally compatible, and therefore have sufficiently similar coefficients of thermal expansion to prevent high thermal stresses during curing (the differences in coefficients of thermal expansion between the plastic material and insert are therefore minimized by Blakeley et al). Furthermore, the plastic material has a sufficiently low modulus to flow around the insert, which is metal, and therefore exhibits (during flow) a lower modulus than the metal.

Applicant also argues, on page 12, that Blakeley et al do not disclose an intermediate layer between the insert portion and composite material. However, Claim 20 is not directed to an intermediate layer between the insert portion and composite material; it is directed to an intermediate layer which is arranged to join the insert to the plastic material. Furthermore, Blakeley et al disclose that the composite material comprises multiple layers of epoxy sheets

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(column 5, lines 1 – 21); every sheet of the composite material is therefore arranged to join the insert to the plastic material, and any sheet which is not in direct contact with the insert constitutes an intermediate layer.

Applicant also argues, on page 13, that Blakeley et al do not disclose an intermediate fiber reinforced layer of a blade. However, as stated above, and any sheet which is not in direct contact with the insert constitutes an intermediate layer.

Applicant also argues, on page 13, that Blakeley et al do not disclose an insert portion having an aperture through which reinforcing fibers are looped. However, as stated above, the composite material comprises fibers, and therefore comprises apertures in which the fibers are contained. Furthermore, Blakeley et al teaches that the graphite – epoxy material flows into contact with the entire surface of the insert portion, including the undulations of the insert (column 5, lines 1 – 21), and therefore forms loops; Blakeley et al therefore disclose an insert portion having an aperture, through which reinforcing fibers are looped.

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

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CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marc Patterson, whose telephone number is (703) 305-3537. The examiner can normally be reached on Monday through Friday from 8:30 AM to 5:00 PM. If attempts to reach the examiner by phone are unsuccessful, the examiner's supervisor, Harold Pyon, can be reached at (703) 308-4251. FAX communications should be sent to (703) 872-9310. FAXs received after 4 P.M. will not be processed until the following business day.

Marc A. Patterson, PhD.

Marc Patterson
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HAROLD PYON
SUPERVISORY PATENT EXAMINER
1772

12/1/03